CLAIMS

1. A melt spinning apparatus for producing a multifilament yarn comprising

an extruder for heating a polymeric material and extruding the resulting melt through a spinneret nozzle to form a plurality of downwardly advancing filaments,

a cooling tube disposed below the spinneret nozzle for receiving the advancing filaments and comprising an inlet, a cylindrical portion below the inlet, and an outlet,

a gas permeable inlet cylinder positioned between the spinneret nozzle and the inlet of the cooling tube,

a suction generating device connected adjacent the outlet of the cooling tube so as to generate an initial cooling air stream through the cooling tube in the direction of the advancing filaments,

an air supply device for generating an additional cooling air stream in the cooling tube, with the air supply device being positioned downstream of the inlet of the cooling tube,

guide means for gathering the advancing filaments to form an advancing multifilament yarn, and

a winder for winding the advancing multifilament yarn into a package.

2. The melt spinning apparatus as defined in Claim 1 wherein the air supply device is connected to the cooling tube such that the initial cooling air stream and the additional cooling air stream flow together in the direction of the advancing filaments.

3. The melt spinning apparatus as defined in Claim 2 wherein the air supply device comprises at least one

opening in the cooling tube between the inlet and the outlet, and wherein ambient air is caused to enter the cooling tube through the at least one opening by the suction generating device so as to form the additional cooling air stream.

4. The melt spinning apparatus as defined in Claim 2 wherein the air supply device comprises at least one opening in the cooling tube between the inlet and the outlet, and an air stream generator connected to the at least one opening, and wherein air is caused to positively enter the cooling tube through the at least one opening by the air stream generator so as to form the additional cooling air stream.

5. The melt spinning apparatus as defined in Claim 4 wherein the air stream generator comprises an injector which has a nozzle bore and a source of compressed air connected to the nozzle bore, with the nozzle bore of the injector communicating with the at least one opening, and wherein the cooling tube defines a center axis, and wherein the nozzle bore is inclined with respect to the center axis at an angle less than 90° so that the additional cooling air enters the cooling tube in a direction having a component in the direction of the advancing filaments.

6. The melt spinning apparatus as defined in Claim 2 wherein the air supply device comprises at least one opening in the cooling tube between the inlet and the outlet, and further comprising an adjustment device for varying the flow cross section of the at least one opening.

7. The melt spinning apparatus as defined in Claim 6 wherein the adjustment device comprises a sleeve which is slideably mounted on the cooling tube for completely or partially closing the at least one opening.

8. The melt spinning apparatus as defined in Claim 6 wherein the adjustment device comprises an air chamber externally enclosing the at least one opening, and a throttling device for controlling air supplied to the air chamber via a supply line.

9. The melt spinning apparatus as defined in Claim 8 wherein the supply line has a free end which is connected to an air stream generator.

10. The melt spinning apparatus as defined in Claim 2 wherein the air supply device comprising an annular perforated sheet element which forms the entire circumference of a portion of the cooling tube.

11. The melt spinning apparatus as defined in Claim 10 wherein the annular perforated sheet element forms part of the cylindrical portion of the cooling tube.

12. The melt spinning apparatus as defined in claim 10 wherein the perforated sheet element is conically shaped with its cross section increasing in the direction of the advancing filaments and positioned at the outlet of the cooling tube and upstream of the suction generating device.

13. The melt spinning apparatus as defined in Claim 1 wherein the air supply device is connected adjacent the outlet of the cooling tube and so as to be positioned

below the suction generating device such that the additional cooling air stream flows opposite to the direction of the advancing filaments.

14. The melt spinning apparatus as defined in Claim 13 wherein the air supply device comprises a second cooling tube through which the filaments advance, and wherein the second cooling tube is axially connected to the first mentioned cooling tube adjacent the outlet thereof and such that the additional cooling air stream is generated by the suction generating device.

15. The melt spinning apparatus as defined in Claim 14 wherein the second cooling tube comprises an inlet and a cylindrical outlet, and wherein the air supply device comprises at least one opening in the cylindrical outlet of the second cooling tube.

16. The melt spinning apparatus as defined in Claim 14 wherein the second cooling tube includes an inlet and wherein the outlet of the first mentioned cooling tube and the inlet of the second cooling tube are interconnected by an outlet chamber, with the suction generating device being connected to the outlet chamber.

17. A method for melt spinning a multifilament yarn comprising the steps of

extruding a heated polymeric material through a spinneret nozzle to form a plurality of downwardly advancing filaments,

guiding the downwardly advancing filaments through a precooling zone and then through a cooling zone which comprises a cooling tube, while generating a vacuum atmosphere in the cooling tube so that an initial cooling

air stream is generated in the tube which flows in the direction of the advancing filaments, and while generating an additional cooling air stream in the cooling zone, and with the speed of the initial cooling air stream and the additional cooling air stream being coordinated with the speed of the advancing filaments such that the filaments solidify within the cooling tube,

gathering the advancing filaments to form an advancing multifilament yarn, and

winding the advancing multifilament yarn into a package.

18. The method as defined in Claim 17 wherein the additional cooling air stream flows within the cooling zone in the same direction as the initial cooling air stream.

19. The method as defined in Claim 17 wherein the additional cooling air stream flows within the cooling zone opposite to the direction of the advancing filaments.

20. The method as defined in Claim 17 wherein the filaments solidify prior to the step of gathering the filaments.